used This is done by spreading poisoned grain about the runs of the rabbits or by poisoning the water-tanks. But poison has not turned out successful, and there is besides great objection to the employment of such a dangerous agent in any case.

The introduction of some infectious disease to kill the rabbits has also been advocated, and even tried in certain districts, but it has not succeeded. In this instance, even Pasteur attained no definite result.

In these circumstances, Mr. Rodier's plan, as set forth in his pamphlet, which is certainly theoretically correct, ought to be tried by the authorities on a large scale. It would be easy to fence round a few thousand acres in one of the worst districts and see what effect will be produced by capturing the rabbits alive and killing only the females. Mr. Rodier tells us that his plan has succeeded well at Tambua Station, and there is every reason to suppose that it would succeed elsewhere if it were properly tried.

THE ROYAL HORTICULTURAL SOCIETY.[1]

FEW things have been more gratifying to those "seriously" interested in horticulture than the great improvement that has taken place in the publications of the Royal Horticultural Society during the last few years. The Society has more than recovered from the disasters that befell it at South Kensington. The present year is not yet completed, but already more than one thousand new fellows have been elected. There is every probability that the approaching centenary will be fittingly celebrated by the erection of proper offices, including an exhibition hall and accommodation for the excellent Lindley Library. This latter is the property of certain trustees, but is inseparable from the Society so long as it exists as a corporate body in or near the metropolis.

One potent reason for the phenomenal success which has of late years distinguished the Society is to be found in the zeal, energy and organising faculty of the secretary. In no respect are these qualities more conspicuously illustrated than by the publications of the Society edited by him.

The papers contributed to the *Journal* have almost always been good of their kind, but they were published at irregular, often very long, intervals, so that interest in them flagged or disappeared entirely.

Under the editorship of the present secretary, the quality of the *Journal* has been more than maintained, whilst comparative regularity of publication has been ensured; so that those fellows whose distant residence precludes them from availing themselves to the full of their privileges may yet be assured that in the *Journal*, as now issued, they have a full equivalent for their subscription, and, as far as possible, are kept abreast of the proceedings at headquarters.

The current number shows an improvement on its predecessors in the fact that a larger infusion of original illustrations has been vouchsafed. Among these we may mention the three coloured plates illustrative of several of the more common fungi which attack garden plants. The article on which these plates confer additional value is the production of Dr. M. C. Cooke, and we are glad to see it is marked "to be continued," for a more complete list of this kind than any that has yet appeared is greatly wanted by gardeners. Another paper illustrated by original half-tone blocks is that on "plant communities" by Prof. Carr, of Nottingham; at least we are not so familiar with them as with the numerous cuts which have done duty before in the various horticultural journals.

During the last year or two, a very useful addition has been made to the Society's records in the shape of short abstracts from current horticultural literature relating to the garden and its inhabitants. These are supplied by a goodly number of trained experts, and when experience has taught them a due sense of proportion and a more rigid selection of what is appropriate to a horticultural journal, their value will be even greater than it is now. This portion of the volume will require the greatest care in indexing, as without a comprehensive index reference will be greatly hampered. The contents are so varied that further detailed comment is impracticable. It must suffice to say that all classes of horticulturists, practical, scientific, æsthetic or amateur, will find something to interest them in these pages.

[1] *The Journal of the Royal Horticultural Society* (September, 1902). Edited by the Rev. W. Wilks, M.A., Secretary.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The resolution, "That candidates shall not be required to offer both Greek and Latin in the examination in stated subjects in Responsions," submitted to Congregation on Tuesday, was lost by 189 votes to 166. If the resolution had been carried, a proposal would have been brought forward on November 18, "That all candidates shall be expected to pass in two out of the four following languages:—Greek, Latin, French and German, one of the two being either Greek or Latin." By the decision of Congregation on Tuesday, Greek remains a compulsory subject at Responsions for all candidates; but the subject may be brought up again by a proposal to exempt candidates for honours in certain of the final schools from the compulsion of Greek.

Mr. George Herbert Grosvenor, B.A., New College, has been appointed to the biological scholarship at Naples for the year 1902–3.

THE late Colonel Walter Montgomerie Neilson, who was the son of the inventor of the hot-blast as applied to iron-smelting, and who, in a sense, was the founder of the locomotive trade in the Glasgow district, has made a bequest of 500*l.* in memory of his father, Mr. James Beaumont Neilson, to the Glasgow and West of Scotland Technical College, for the establishment of a gold medal and prize to be awarded each year to the best student of the College completing his course of study of three years for the diploma in mechanical engineering. The medal and prize are to continue the name of, and the invention by, Beaumont Neilson. The medal will be of the value of 10*l.*, and the prize will consist of books.

DR. G. R. PARKIN, the organising agent for the trustees of the Rhodes scholarships, is at present in Oxford to consult with the University and college authorities before proceeding to frame, for the approval of the trustees, a scheme for the election of the scholars. Dr. Parkin states that according to their size, each of the colleges seems prepared to take from two to five of the Rhodes scholars every year. This would give to the smaller colleges six in all for the three years' scholarship, and to the larger colleges about fifteen, when the plan is in full operation. The first year the bequest comes into operation there will be elected probably between seventy and seventy-five scholars, the same number for the second year, for the third year about thirty, and in subsequent years the same proportion will be maintained.

IN the course of an address delivered at the Liverpool School of Science on Saturday last, the Bishop of Liverpool remarked that the time had passed for ever when Great Britain stood first and the other nations of the world nowhere. There was great need for energy and exertion, and great care must be taken to develop on educational lines as fast as possible. Technical schools were meeting a real national need and helping to preserve the greatness of the Empire. They were bringing British science and industry together, and in future they would find that science would transfigure industry, and industry would make science more practical. But what were first needed were the unification of education and the full sympathy and cooperation of employer and employed, in which respect foreigners were somewhat ahead of us.

M. BORIS WEINBERG, of the University of Odessa, has recently completed an interesting inquiry into the provisions for the practical study of science made in 206 laboratories in connection with colleges in Europe, America and Australia. In March, 1900, M. Weinberg sent a circular letter to the directors of all physical, mechanical, electrotechnical and chemico-physical laboratories mentioned in the "Minerva Jahrbuch," asking for information as to the number of demonstrators teaching in the laboratories in 1900 and in previous years so far back as 1865, the number of students in the same years, the smallest number of students working at the same time in the laboratory, the hours devoted to practical work by each student during a week, and many similar points. His results are now published, and deal with typical university colleges, medical schools, technical colleges, &c., of the countries of Europe, of the United States and of Australia. The most valuable part of the information brought together in the pamphlet is the careful

analysis of the courses of study in physics in the different institutions from which data were received. In his circular to laboratory directors, M. Weinberg tabulated some 910 typical practical exercises in physics and requested that those worked in the laboratories might be underlined. It has thus been possible to institute an instructive comparison between the methods of different countries. About four hundred physical laboratories, having five hundred professors and eight hundred demonstrators or assistants, are recorded for the whole of the institutions for higher education in the world. In about one-fifth of these, practical work in physical manipulations is not carried on; in the rest, there are about 25,000 students who pass eight hours a week in the laboratories during three semesters. In these four hundred hours passed in the laboratory a student, on the average, performs sixty different experiments, or about two-thirds of the work for which the laboratory makes provision.

SCIENTIFIC SERIALS.

American Journal of Science, October.—An experimental investigation into the existence of free ions in aqueous solutions of electrolytes, by Julius Olsen. The well-known experiment of Ostwald and Nernst, which has been held to prove experimentally the existence of ions in solution, is criticised, and it is held that the conclusion arrived at does not necessarily follow, and that further proof is needed. Experiments are described which show that an electrolyte which has never been acted upon by a current behaves as if it contained particles charged with electricity which are free to move, and these particles have not been produced by a current. This corresponds to the definition of free ions.—On the solution of problems in crystallography by means of graphical methods, based upon spherical and plane trigonometry, by S. L. Penfield. It is shown that with the addition of certain stereographic scales and protractors to a set of ordinary drawing instruments, the lengthy calculations usual in determining the crystallographic constants can be avoided or, as an alternative, checked. Several illustrated examples of the mode of application of this method are given.—The estimation of bromic acid by the direct action of arsenious acid, by F. A. Gooch and J. C. Blake. It is shown that bromates may be satisfactorily estimated by the direct action of arsenious acid, the few apparent discrepancies which were found being traced to the presence of chlorate as an impurity in the bromate.—Solubilities of some carbon compounds, the densities of their solutions, by Clarence L. Speyers. Seven or eight carbon compounds of different types were examined in various solvents, including water, methyl, ethyl and propyl alcohols, chloroform and toluene. The results are compared with those calculated from Schroeder's formula, but the agreement is not good.

Transactions of the American Mathematical Society.—Vol. iii. No. 3 (July).—L. E. Dickson, on the group defined for any given field by the multiplication table of any given finite group. The subject of this paper is much the same as that of Burnside's in *Proc.* L.M.S. xxix.; the results, however, are obtained by a different method, which does not involve the theory of continuous groups. The paper illustrates the importance of Frobenius's discovery of the group determinant. Two examples are given.—O. Stolz, postscript to a previous article on rectification of curves. A comparison is made with Jordan's treatment of the same theory.—O. Bolza, proof of the sufficiency of Jacobi's condition for a permanent sign of the second variation in the so-called isoperimetric problems.—H. E. Hawkes, on hypercomplex number systems. The author develops the methods of Peirce, and shows that they give an enumeration of all systems in less than six units which have moduli in more than one idempotent unit. The systems for five units with two idempotent units are worked out in detail. A discussion of nilpotent systems follows.—W. B. Fite, on metabelian groups.—L. P. Eisenhart, on conjugate rectilinear congruences.—D. N. Lehmer, constructive theory of the unicursal plane cubic by synthetic methods.—L. E. Dickson, on the groups of Steiner in problems of contact (continued from the January number).

Bulletin of the American Mathematical Society (2) ix., No. 1 (October).—O. Bolza, examples in the calculus of variations — E. R. Hadrick, on the sufficient conditions in the calculus of variations. A convenient summary, based on lectures by Hilbert.—E. B. Wilson, reviews of recent books on mechanics (Föppl, Volkmann, Picard).—E. V. Huntington, on a new edition of Stolz's "Allgemeine Arithmetik," with an account of Peano's definition of number.—E. J. Wilczynski, an obituary notice of Fuchs.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, October 31.—Prof. S. P. Thompson, president, in the chair.—A paper on the existence of a relationship between the spectra of some elements and the squares of their atomic weights, by Dr. W. M. Watts, was read by Prof. Everett. The author has detected two kinds of relation between the spectra of some allied elements. In the first kind, which is illustrated by comparisons between zinc, cadmium and mercury, and also between gallium and indium, the differences between the oscillation frequencies of certain lines of one element are to the differences between the oscillation frequencies of the corresponding lines of another as the squares of their atomic weights. In the second kind, the relation is not between two, but between three spectra, and is illustrated by the trio potassium, rubidium and cæsium, as well as by the trio calcium, strontium and barium. The element of greater atomic weight has the smaller frequency, and, in comparing corresponding lines, one from each of the three spectra, the differences of frequency are proportional to the differences between the squares of the atomic weights. If each of the spectral lines in question is represented by a point the coordinates of which are "frequency" and "square of atomic weight," the three points which represent three corresponding spectral lines will lie on one straight line in the diagram, and these straight lines will be parallel for all the components of a given set of corresponding groups. When a similar mode of plotting by points is employed to exhibit the first kind of relation, the joins of corresponding points meet in a point which lies on the axis of frequencies, in other words, on the line of zero atomic weight. This relation was indicated by Ramage about a year ago as holding for corresponding doublets and triplets.—A paper on the size of atoms was read by Mr. H. V. Ridout. This investigation deals with the size of dissociated atoms, or ions, and the results obtained refer to a dissociated atom as the smallest quantity of matter which can take part in an electrolytic action. The element chosen is hydrogen, and the author concludes that, in round numbers, $114\frac{1}{2}$ million atoms are necessary to form a line one centimetre long. The method employed consists in finding a pair of spheres which would be charged by the quantity of electricity known to be necessary to electrolyse a given quantity of the body under examination—in this case water—to the known difference of potential of its ions. From this the size of the atoms is deduced, subject to certain assumptions enumerated and discussed in the paper. Lord Kelvin remarked that he had often concerned himself with the size of atoms, and pointed out that the value obtained by the author for the diameter of a hydrogen ion was almost exactly one-half of that which he had obtained for the diameter of a molecule of hydrogen. The fact, however, might be a coincidence. He had dealt with a sphere which would have the same effect as a double atom of hydrogen. While avoiding the assumption that atoms are hard and spherical, it was usual to treat them as such for purposes of calculation. The paper was an important one, but there were many assumptions which required looking into. Lord Kelvin said that, in dealing with the subject of atoms, it was necessary to consider the atoms of electricity. The atomic theory of electricity, now almost universally accepted, had been thought of by Faraday and Clerk-Maxwell and definitely proposed by Helmholtz. The atoms of electricity were very much smaller than the atoms of matter, and permeated freely through the spaces occupied by these greater atoms and also freely through space not occupied by them. An atom of electricity in the interior of an atom of matter experienced electric force towards the centre of the atom. We were forced to conclude that every kind of matter had electricity in it, and Lorenz had named electricity as the moving thing in atomic vibrations. If the electrons, or atoms of electricity, succeeded in getting out of the atoms of matter, they proceeded with the velocity of light and the body was radioactive. It was therefore not surprising that some bodies showed radioactive properties, but rather surprising that such properties were not shown by all forms of matter. Our knowledge of this subject,